WHITE-SPOTTED SAWYER BEETLE IN LOGS

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INTRODUCTION

Several species of wood-boring insects cause damage in coniferous logs by boring tunnels or "worm holes". This damage may result in down-grading of lumber, increased handling time in plywood manufacture, rejection of logs for power poles, fiber loss for pulp, and may assist penetration of sap rot and stain fungi into wood. In the prairie provinces and Northwest Territories most wood borer damage in logs is caused by the white-spotted sawyer beetle, *Monochamus scutellatus* (Say).

LIFE HISTORY AND HABITS

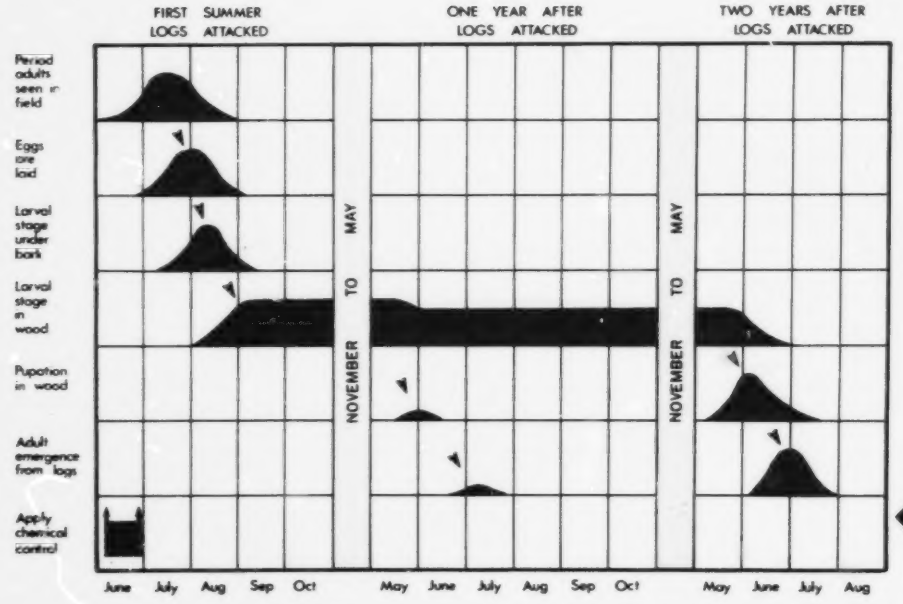
Adults of the white-spotted sawyer beetle attack recently felled, injured or dying pine, spruce, balsam fir, Douglas-fir, and occasionally tamarack. The adults are seen in the field from late May to early September but are most abundant in June and early July, when they may appear in large numbers in mill yards, on log decks, or in newly cutover areas. They are large blackish beetles 1.5-3.0 cm long with a white spot at the base of the wings from which their name is derived, strong flyers, and most active during warm sunny days. They feed for a few days on the tender bark and twigs of coniferous foliage, then seek out suitable host logs for mating and egg-laying. The female deposits her eggs singly in slits chewed in the bark. She lays most eggs on the shaded sides of exposed logs, usually avoiding logs in deep shade such as within log decks or in heavily shaded portions of the forest. Egg-laying extends from late June to early September.

The young larvae hatch after 9-14 days, bore through the bark in 2-3 days, and feed for 2-3 weeks in the bark and outer sapwood. Here they engrave an irregularly shaped gallery pattern. Worm-hole damage begins in early August when the larvae are 2.0-2.5 cm long and begin boring into the wood. When penetrating the wood the larvae chew characteristic oval-shaped holes through which they extrude excelsior-like borings to the surface. These borings form small piles below each entry hole and are a clear indication of an infested log. By early October or the following spring or summer they have penetrated to an average depth of 8.5 cm although they may bore as deeply as 15 cm. They then make a U-turn and bore back toward the log surface.

The larvae usually spend two winters in the logs and at maturity are white legless grubs 3.5-5.0 cm long. Pupation occurs in a widened portion of the gallery near the log surface during the second spring after the log was attacked; the adults emerge in June and July. The life cycle of the sawyer beetle thus takes 2 years to complete although some individuals mature in 1 year and others require 3 years. Because of overlapping generations new adults emerge each year, but may be more abundant in some years because of different breeding material and habitat conditions.

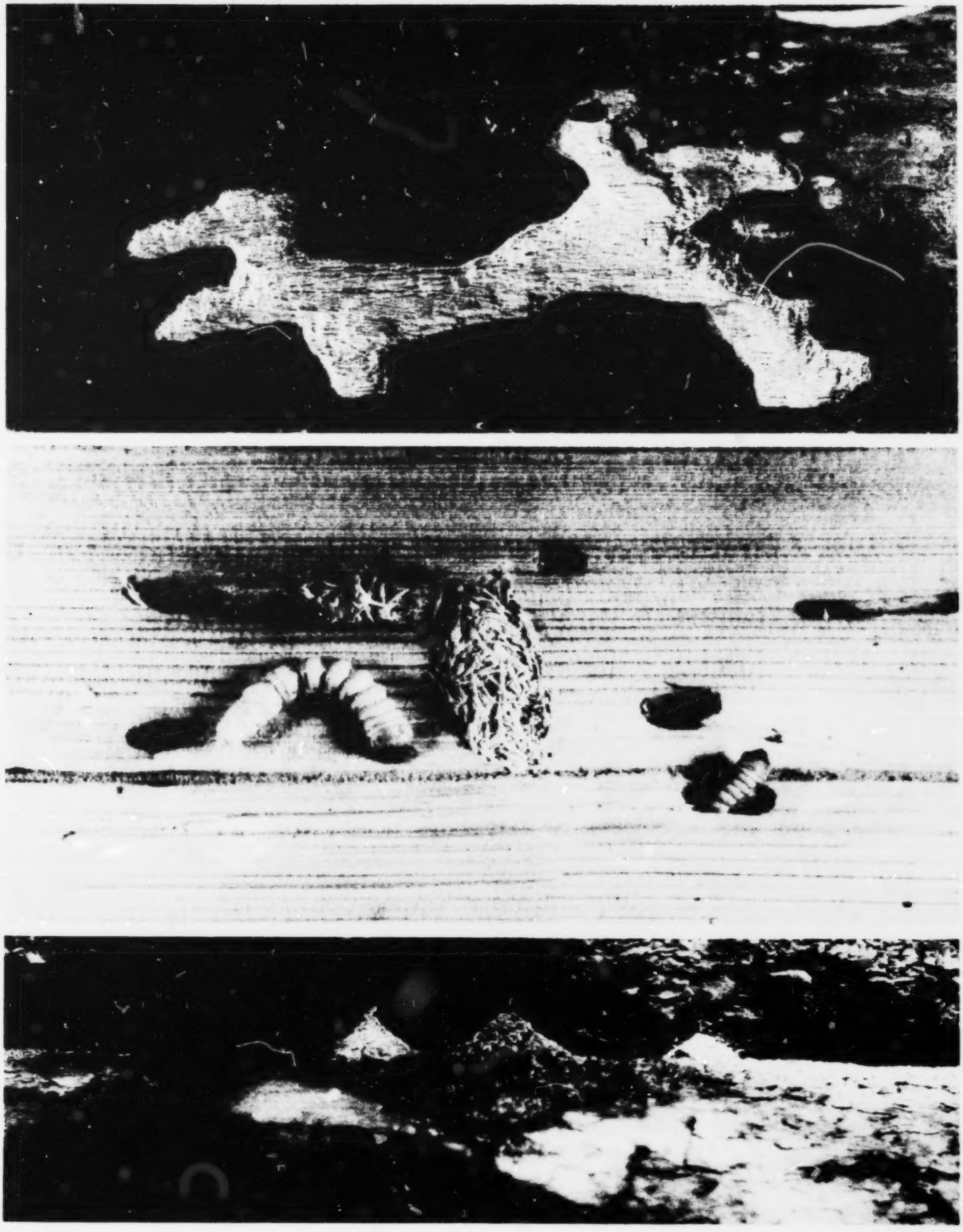
Typical gallery pattern engraved in the outer sapwood and the oval-shaped entrance to the tunnel (X 1).

Mature larvae, larval tunnels, and excelsior-like borings (X 1.5).


FIRST SUMMER LOGS ATTACKED
ONE YEAR AFTER LOGS ATTACKED
TWO YEARS AFTER LOGS ATTACKED
Period adults seen in field
Eggs are laid
Larval stage under bark
Larval stage in wood
Pupation in wood
Adult emergence from logs
Apply chemical control
NOVEMBER TO MAY
NOVEMBER TO MAY
June July Aug Sep Oct
May June July Aug Sep Oct
May June July Aug

Piles of sawdust found below each entry hole (X 0.5).

Life history.



DAMAGE

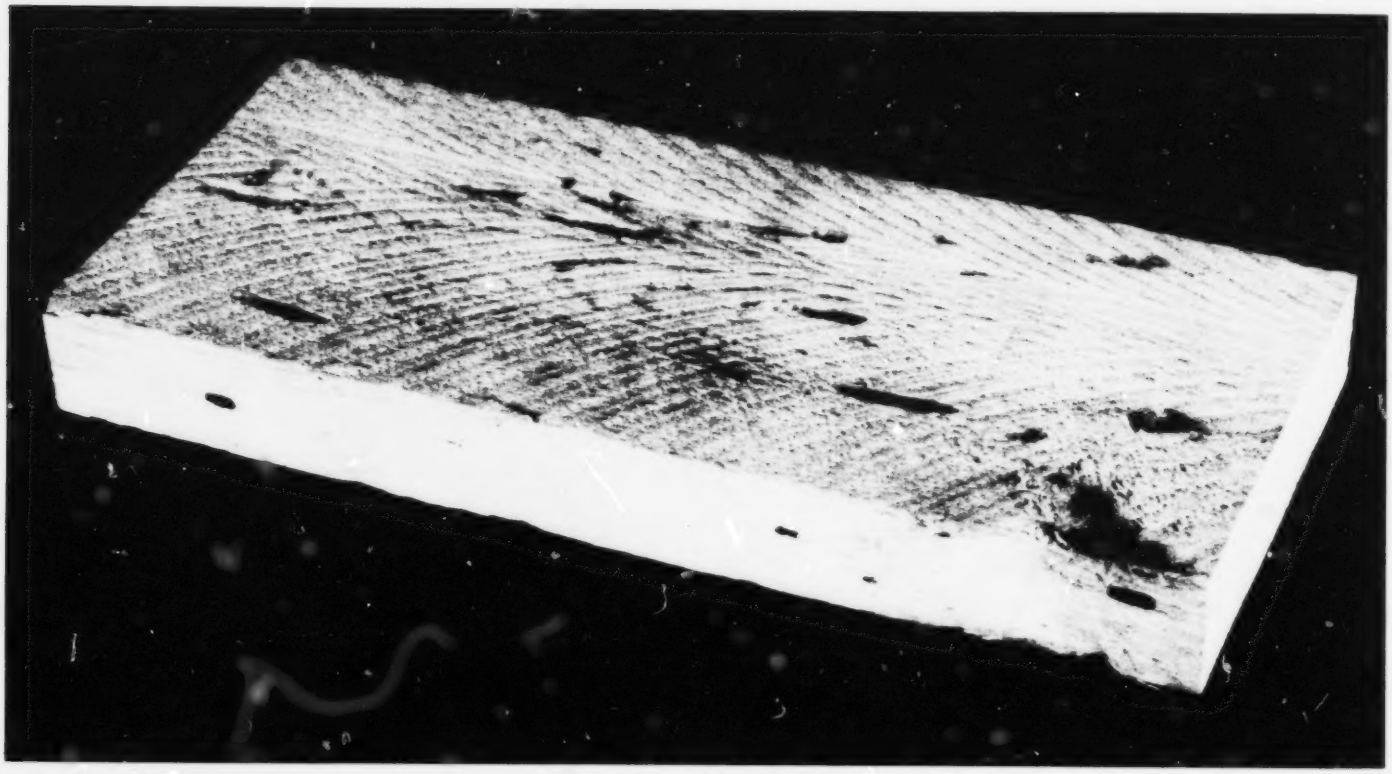
Presently, about 90% of the annual lumber production of spruce, pine and fir in the prairie provinces is cut as dimension lumber, of which over half is in studs. Degrade due to worm holes in studs is unlikely according to current Standard Grading Rules for Canadian Lumber. However, other use categories such as structural light framing and structural joists and planks have defined limits for number of worm holes and are downgraded for exceeding the limits. Estimates of value loss of lumber products cut from infested logs may range up to 30%.

The holes also permit entry of wood-staining and decay fungi which may cause further down-grading. However, such losses are a function of borer hole density and size of the log. In general, the larger the log, the greater is the proportion of worm-hole-free lumber.

Studies of felled spruce logs indicate a greater density of attacks per unit area of log surface toward the top of the tree. Consequently, lumber cut from small diameter size logs and from logs at the top of trees tend to be damaged most. Occasionally, lumber infested with live wood borer larvae may cause concern to the user, for fear of re-infestation and further damage. However, these larvae present little hazard since most do not survive.

In recent years the marketing of power poles from lodgepole and jack pine has increased substantially. Grading regulations for power poles are strict, and essentially no worm holes by the sawyer beetle are permitted since the presence of only one larval gallery can increase the risk of wind-breakage.

Loss of fiber on heavily attacked logs results from surface feeding and larval tunnels, but is usually less than 5% of the log volume.



Dimension lumber with numerous "worm holes".

PREVENTIVE MEASURES

In most cases, prompt utilization of cut and salvage logs before mid-August of the first year after cutting prevents most worm-hole damage. Damage within the logs increases from mid-August until freeze-up of the first year the logs are attacked and, if left unprocessed, further damage will be done in the following spring and summer when the larvae renew their gallery excavations.

During the summer period while adult sawyer beetles are present all logs cut since the previous fall are attractive sites for egg-laying, provided the trees were alive or recently killed at the time of cutting. Trees injured and dying from blowdown and fires are also subject to attack except when severely burned or peeled. Peeled logs and freshly cut lumber, and unpeeled logs held over a second summer are no longer attractive for further attacks. Kiln-drying of infested lumber kills all larvae present in galleries, preventing further degrade.

A problem arising in the salvage of logs in newly burned-over areas concerns the time of death and subsequent attack of trees. Trees killed at the time of the burn may be attacked first while those weakened by the fire may remain alive for one or more years and are thus attractive to the sawyer beetle over a longer period. These weakened trees should be removed at the time of salvage since they are a source of breeding material and may help to maintain high populations of wood-boring insects in timber harvest areas.

When logs have to be left in the forest following spring break-up or during fire salvage, they should be stored in high, compact decks to decrease the log surface area available for suitable egg-laying sites, and to increase shading within the decks. Orientation of the log decks with the butt ends facing south may also increase within-deck shading. Some protection against attacks may be gained if the decks are located in shaded portions of the forest. Usually only the top two to three log layers are attacked in compact decks, whereas in loosely packed decks attacks may extend to the bottom logs. All logs left scattered during the summer are generally attacked, and often more heavily than those in log decks.

Decks consisting of tree-length logs are more difficult to stack neatly than shorter cut logs because of their variable length and lack of maneuverability. Consequently, they tend to be piled more loosely and have the top ends staggered. This exposes more log surface area for egg-laying and can result in a higher incidence of damage at the top ends.

There is some evidence that logs cut in the fall and early winter are less attractive for egg-laying than logs cut later in the winter or spring. Hence, log decks might be made less attractive during the summer if first-cut logs formed the top layer.

All wood borer damage is prevented if logs are stored in water of if decks are sprinkled continuously with water during the egg laying period.

Recently burned-over stand of spruce and pine.

White spruce logs decked in variable tree-lengths with staggered top ends.

CHEMICAL CONTROL

Although natural control factors contribute substantially to mortality of larvae within logs, occasions sometime arise when application of insecticide is necessary to protect valuable logs from worm-hole damage and prevent down-grading of the finished product. Lindane (minimum 99% gama isomer of BHC) is registered in Canada for treatment of wood borer-infested logs. The recommended concentration (0.4% solution with water*) is sprayed on all exposed surfaces of logs and log decks to the point of runoff; treated logs must not be put into water within 6 weeks after treatment. Coverage of the top-end portion of tree-length log decks should be as thorough as possible. For winter and spring-cut logs, best protection is achieved if the spray is applied in early June prior to most egg-laying. Logs cut after June may be attacked immediately and should be sprayed as soon as they are piled. Only one application is considered necessary. Lindane spray treatment may act as a repellent and kill or discourage adults from laying, and also kill young larvae before they become established.

***LINDANE IS SOLD AT SEVERAL CONCENTRATIONS WITH THE PERCENTAGE GIVEN ON THE CONTAINER. THEREFORE, DEPENDING UPON THE CONCENTRATION, THE AMOUNT OF LINDANE MIXED WITH WATER SHOULD BE ADJUSTED SO THAT THE FINAL SPRAY SOLUTION WILL HAVE 0.4% ACTIVE INGREDIENT.**

Lindane is poisonous and all manufacturer's instructions and safety precautions must be strictly adhered to.

SELECTED READING

ANONYMOUS. 1973. Standard Grading Rules for Canadian Lumber. National Lumber Grades Authority 1970. Vancouver, B.C.

BECKER, W. B. 1966. Worm-hole-free lumber salvaged from borer-damaged pine logs. J. For. 64 (2): 126-128.

BECKER, W. B. and H. G. ABBOTT. 1961. Prevention of insect damage to decked pine sawlogs in Massachusetts with BHC emulsion sprays. J. For. 59 (5): 366-369.

BELYEA, R. M. 1952. Death and deterioration of balsam fir weakened by spruce budworm defoliation. Pt. I Can. Ent. 84 (11): 325-335.

GARDINER, L. M. 1962. Survival of woodborers in water-stored logs. For Chron. 38: 459-462.

GARDINER, L. M. 1970. New northern Ontario spruce beetle compels May start on log spraying. Can. For. Ind. July 1970: 50-53.

HARRIS, J. W. E., J. GRANT and H. RICHMOND. 1968. Assessment of woodborer control trials, Mackenzie, British Columbia, 1967. Can. Dep. For. Rural Devel., For., Br., For. Res. Lab. Victoria, B.C., Inf. Rep. BC-X-21, 7p.

PREBBLE, M. L. and L. M. GARDINER. 1958. Degrade and value loss in fire-killed pine in Mississagi area of Ontario. For. Chron. 34: 139-158.

PRENTICE, R. M. and A. E. CAMPBELL. 1959. Volume loss of pulpwood in Manitoba caused by wood borers. For. Chron. 35: 142-145.

RASKE, A. G. 1973. Relationship between felling date and larval density of **Monochamus scutellatus.** Environ. Can., Can. For. Serv., Bi-Month. Res. Notes 29 (4): 23-24.

RICHMOND, H. A. and R. R. LEJEUNE. 1945. The deterioration of fire-killed white spruce by wood-boring insects in northern Saskatchewan. For. Chron. 21: 168-192.

ROFF, J. W. and J. DOBIE. 1968. Beating the beetles. B. C. Lumberman 52 (5): 60-63 and 70-71.

ROSE, A. H. 1957. Some notes on the biology of **Monochamus scutellatus** (Say) (Coleoptera: Cerambycidae). Can. Ent. 89: 547-553.

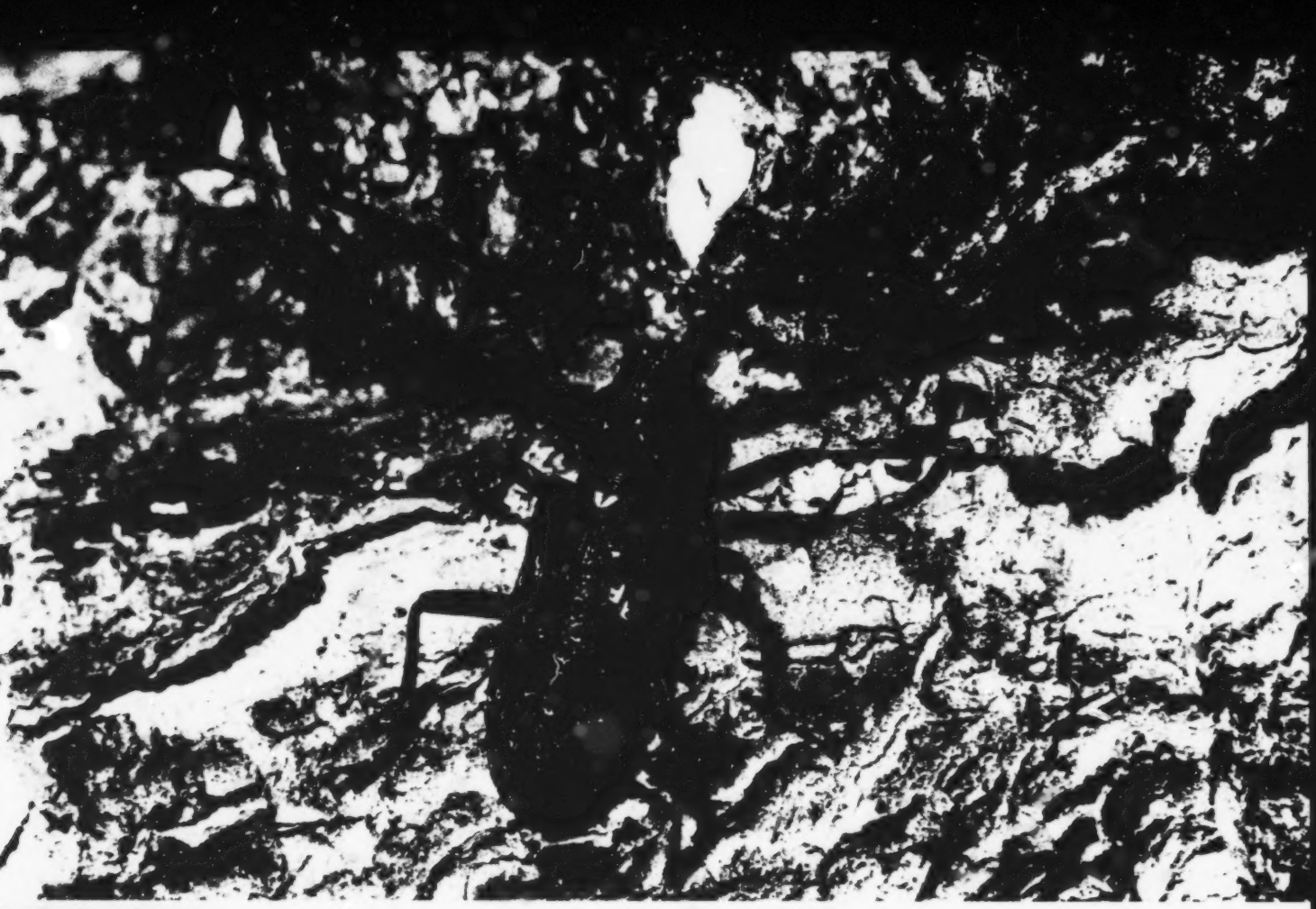
ROSS, D. A. 1960. Damage by longhorned wood borers in fire-killed white spruce, central British Columbia. For. Chron. 36: 355-361.

ROSS, D. A. and J. S. DOWNTON. 1966. Protecting logs from longhorned woodborers with lindane emulsion. For Chron. 42: 377-379.

SAFRANYIK, L. and A. G. RASKE. 1970. Sequential sampling plan for **Monochamus** larvae in decked lodgepole pine logs (Coleoptera: Cerambycidae). J. Econ. Ent. 63: 1903-1906.

WILSON, L. F. 1962. White-spotted sawyer. U.S. Dept. Agr., Lake States For. Exp. Sta., For. Pest Leafl. No. 74, 7 p.

Adults (X 4).



Although this brochure contains the latest technical information available, application of the chemical recommendations is at the user's risk and subject to any law that may apply.

Additional information or copies of this report may be obtained from:

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